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## ENUMERATION OF THE LIGNEOUS PLANTS COLLECTED BY J. F. ROCK ON THE ARNOLD ARBORETUM EXPEDITION TO NORTHWESTERN CHINA AND NORTHEASTERN TIBET (ADDITIONS AND CONTINUATION)<sup>1</sup>

ALFRED REHDER AND CLARENCE E. KOBUSKI

Page 20 of vol. IX. insert before LILIACEAE:

### GNETACEAE

Determined at the Botanical Museum, Berlin-Dahlem

**Ephedra monosperma** C. A. Meyer, Versuch. Monog. Ephedra, 89, t. 8, fig. 11. (1847).—Stapf in Denkschr. Math.-Nat. Cl. Akad. Wiss. Wien, LVI. pt. 2, p. 73, t. 3, fig. xix. 1–9, xxxi. 3 (Art. Ephedra) (1889)

EASTERN TIBET. Radja and Yellow River gorges: among schist rocky slopes of river valley, west of Radja, alt. 3350 m., no. 13939, May 27, 1926 (plant 5 cm. high; flowers yellow).

### LILIACEAE

Page 20 insert before SMILAX TRACHYPODA Nort.:

**Smilax Oldhamii** Miquel in Versl. Med. Kon. Akad. Weten. ser. 2, II. 86 (1868); in Ann. Mus. Bot. Lugd.-Bat. III. 150 (1868).—Norton in Sargent, Pl. Wilson. III. 9 (1916).

CENTRAL KANSU: Li en h o a s h a n , no. 13664, Oct. 1925 (climber over bushes; fruit purplish black).

This species does not seem to have been recorded from China before.

Page 22 insert:

### SALICACEAE

#### *Populus* L.

Determined by ALFRED REHDER

**Populus cathayana** Rehder in Jour. Arnold Arb. XII. 59 (1931).  
SOUTHWESTERN KANSU. Lower Tebbu country: banks

<sup>1</sup> See Vol. IX. 4–27, 37–125 (1928) for preceding parts of this Enumeration.

of Culungapu above Pezhu, no. 14961, Sept.-Oct. 1926 (pyramidal tree with broad crown, 15-18 m., leaf pale green above, grayish beneath).

*Populus Simonii* Carrière in Rev. Hort. 1867, p. 360.—Rehder in Jour. Arnold Arb. XII. 63 (1931).

*Populus Przewalskii* Maximowicz in Mél. Biol. XI. 321 (1881); in Bull. Acad. Sci. St. Pétersb. XXVII. 540 (1882).

SOUTHWESTERN KANSU. Tao River basin: Choni, along bank of Tao River, no. 12110, May 1925 (tree 15-18 m., pistillate); mountains of Choni, in forests and on banks of streams, alt. 3000 m., no. 12114, May 1925 (tree 20-24 m., staminate, catkins bright red).

Both specimens are leafless; the pistillate catkins are 2.5-3.5 cm. long with a short-pilose rhachis and short-pedicelled flowers; the ovary is slightly hairy and bears two stigmas.

Photographs representing habit and bark of this species and taken by Rock in January 1926 (no. 12110 according to his notes) are in his collection of photographs. In habit the trees resemble *Populus nigra* L.

***Populus nigra* Linnaeus, Spec. Pl. 1464 (1753).**

NORTHWESTERN KANSU. Richthofen range and adjacent region: Kanchow plain, no. 13325, Nov. 1925 (tree 30 m. or more; trunk white).

I refer this specimen with some doubt to *P. nigra*; the branches are distinctly angular in their upper part, though perfectly terete in their lower third; the leaves are deltoid, truncate at the base, short-acuminate, and of firm subcoriaceous texture, and the bark of the trunk is white according to Rock.

***Populus nigra* L. var. *italica* Duroi, Harbk. Baumz. II. 141 (1772).**

SOUTHWESTERN KANSU. Lower Tebbu country: banks of Peshwekiang, alt. 2000 m., no. 14859, Sept. 14, 1926 (tree 24 m., with ascending branches forming an oval to oblong crown; bark grayish white; leaves dark green above, blue green below).

According to Rock's note the tree has not the columnar habit of the Lombardy Poplar, but the branchlets of the specimen are distinctly adscending and the leaves agree with those of *P. nigra* var. *italica*.

***Populus szechuanica* Schneid. var. *Rockii*, var. nov.**

A typo recedit foliis supra in costa et venis villosso-pilosis et subtus in costa, venis et venuulis satis dense et in mesophyllo sparse pilosis.

SOUTHWESTERN KANSU. Lower Tebbu country: Want-sang forests, no. 14846, Sept. 12, 1926 (tree 30 m., trunk 1.25 in.

diam., without branches for 15 or 18 m.; bark drab to grayish brown, longitudinally furrowed; leaf grayish white beneath).

In shape and size of the leaf and in the 3-4-valved capsule the specimen agrees with *P. szechuanica*, but the under side of the leaf is fairly densely pilose on the midrib, veins and veinlets, and also on the upper side the veins are pubescent. In the latter character it resembles *P. Purdomii* Rehd., but that species has 2-3-valved capsules and somewhat narrower leaves glabrous above. It is possible, however, that the sterile specimens from Kagoba, Kansu, referred by me to *P. Purdomii*, belong here.

A picture showing the tall slender trunk of this tree is in the collection of Rock's photographs.

### *Salix* L.<sup>1</sup>

Determined by R. GOERZ

#### Sect. PENTANDRAE Dumortier

##### ***Salix paraplesia*** Schneider in Sargent, Pl. Wilson. III. 40 (1916).

EASTERN TIBET. Radja and Yellow River gorges, with Spruces on northern slopes of valley south of Yellow River, opposite Radja, alt. 3200 m., no. 14111 ♂, June 10, 1926 (shrub to small tree 4.5-6 m.); southwest of Radja, alt. 3200 m., no. 13977 ♀, May 25, 1926 (shrub 2.4-3 m.); above Picea forest, southwest of Radja, alt. 3600 m., no. 13971, May 25, 1926 (shrub 1.2-1.5 m.); opposite Radja, alt. 3500 m., no. 13955 ♂, May 24, 1926 (shrub 1.5-2.4 m., leaf pale green).

SOUTHWESTERN SZECHUAN (Muli): mountains of Kulu, alt. 3380 m., no. 17960 ♂, June 1929. (Shrub 1.5 m.)

The chief difference of this species from *S. pentandra* seems to lie in the whitish color of the under side of the leaves, which, however, is less conspicuous on young leaves and often nearly disappears, as on the plant from Szechuan. Other differences indicated by Schneider in his key (in Sargent, Pl. Wilson. III. 74), as size of catkins, number of stamens and length of style are probably less constant and therefore less important.

#### Sect. SCLEROPHYLLAE Schneider

##### ***Salix oritrepha*** Schneider in Sargent, Pl. Wilson. III. 113 (1916).

As Schneider knew only the pistillate plant the description of the staminate catkins may be given here:

*Amenta coaetanea, pedunculo brevi 2-5 mm. longo foliis parvis 2-3 normalibus suffulto, ovata, 1-1.5 cm. longa, 0.8-1 cm. crassa,*

<sup>1</sup> The Willows collected by Rock in southwestern Szechuan during 1928 and 1929 are included in this enumeration and are distinguished by smaller type.

densiflora; squamae late obovatae, semi-nigrae vel antice purpurascentes, utrinque basi in primis criso-villosae, dorso glabrescentes; nectaria 2, angusta, integra vel 2—pluries anguste lobata; stamina 2, filamentis liberis  $\frac{1}{2}$  pilosis, antheris ovatis aureis.

**EASTERN TIBET.** Alpine region between Radja and Jupar Range: alpine meadows of Wajo la, alt. 4200 m., no. 14154 ♂, June 1926 (shrub 60–90 cm.). Jupar Range: among rocks and alpine meadows, upper Jupar valley slopes, alt. 3600–3900 m., nos. 14294 ♂, 14295 ♀, 14296 ♂, 14297 ♀, 14298 ♀, 14299 ♂, 14300 ♀, 14301 ♂, June 1926 (shrub 0.60–1.20 m.); banks of upper Jupar stream, alt. 3600 m., nos. 14352 ♂, 14353 ♀, June 1926 (shrub 1.20–1.80 m.); valley slopes of Kerab, southern slopes of Jupar range, no. 14410 ♂, June 1926 (shrub 0.90–1.20 m.).

**CENTRAL KANSU.** Lien hoa shan: among rocks, alt. 3500 m. no. 12701 ♀, July 1925 (shrub 0.30–0.60 m.; leaves rich green above, glaucous beneath, male); alpine regions among Rhododendron scrub, alt. 3300 m., no. 12726 ♂, July 1925 (shrub 60–90 cm.; leaves dark green beneath); summit of mountain, alt. 3800 m., no. 13421 (fol.), Nov. 1925 (shrub 1.30 m. or less; semi-prostrate; buds red).

**SOUTHWESTERN KANSU.** Tao River basin: back of Adjuan, on ridges with Birch, Rhododendron and Spruce, alt. 3200–3300 m., no. 12655 ♀, July 5, 1925 (shrub 0.90–1.50 m.); mountains of Adjüan-Toyüku, Pakeshan, alt. 3000–3300 m., no. 13409 ♀, Nov. 1925 (shrub 1.20 m., forming dense bushes on limestone ridges; leaves pale yellowish beneath); mountains beyond Adjüan, Minshan, alt. 3450 m., no. 13414 (fol.), Nov. 1925 (shrub 0.90–1.20 m.; branches thick, reddish; leaves pale, yellowish beneath).

**SOUTHWESTERN SZECHUAN (Muli):** Mount Siga, northeast of Kulu, alt. 4600 m., no. 17883 ♂, June 1929 (shrub 60–90 cm.).

***Salix oritrepha* var. *tibetica* Goerz, var. nov.**

Frutex humilis ad 1 m. altus, dense ramosus ramulis tenuioribus brevibus nodosis, foliis julisque minutis.

**EASTERN TIBET.** Radja and Yellow River gorges: rocky and grassy slopes above Picea forest, northern slopes of Yellow River, southwest of Radja, alt. 3600 m., no. 13969 ♂, May 25, 1926, nos. 13970 ♀, 13972, May 1926 (shrubs 0.60–1.20 m.); alpine meadows between Howa & Arh'tsa canyon, north of Radja, alt. 3450 m., no. 14040 ♂, May 31, 1926 (shrub 90 cm.); north of Radja, alpine slopes of Arh'tsa bluffs, alt. 3300 m., nos. 14053 ♂, 14054, May 31, 1925 (shrub 90 cm.).

**SOUTHWESTERN SZECHUAN (Muli):** Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16036 ♂, June 1928 (semi-prostrate shrub); Mount Siga, northeast of Kulu, alt. 4300 m., no. 17874 ♀, June 1929 (shrub 0.90–1.20 m.).

**Salix muliensis** Goerz, spec. nov.

Frutex humilis v. ad 2 m. altus, ramosus ramulis brevibus nodosis, novellis breviter cinereo-tomentosis, postea glabrescentibus vel pilis brevibus obsitis opacis brunneis v. omnino sordide subatris; gemmae semiconicae, adpressae, brunneae, brevi-pilosae. Folia in petiolo 1–3 mm. longo, juvenilia (matura desunt) subtus pilis brevibus acroscopicis adpressis albo-sericeis tecta, dein glabrescentia, glauca, supra venis tantum pilosis mox glabra, atroviridia, elliptica v. obovato-elliptica, antice rotundata, nervis primariis 3–6, margine integro v. tenuissime glanduloso-denticulato; stipulae 0. Amenta ( $\sigma$  tantum visa) coaetanea in pedunculo 2–3 mm. longo, bracteofoliis squamaceis v. crebrius foliolis normalibus suffulta, subglobosa vel ovata vel brevi-cylindrica, 5–16 mm. longa, 5–8 mm. crassa; squamae obovatae, semi-fuscatae, intus basi criso-pilosae, dorso glabratae; nectaria bina v. dorsale 0, oblonga, ventrale paulo majus; stamina 2 filamentis liberis  $\frac{1}{2}$  pilosis, antheris subglobosis aureis.

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16041  $\sigma$  (shrub 2 m.), no. 16079  $\sigma$ , (shrub  $\frac{1}{2}$  m.), June 1928; Minya Konka Snow Range, south of Tatsienlu, alt. 4600 m., no. 17516  $\sigma$ , July 1929 (shrub 30–60 cm.).

This new species is near *S. oritrepha* Schneid., but differs chiefly in the pubescence of the young leaves. *Salix sclerophylla* Anders. from Kashmir shows, as far as I have seen material, a different, more woolly pubescence of the young leaves. The fine serration of the leaves lacking in the two other species, should also be noted.

**Salix tenella** Schneider in Bot. Gaz. LXIV. 137 (1917).—Handel-Mazzetti, Symb. Sin. VII. 68 (1929).

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16035  $\varphi$ , June 1928 (shrub 2–3 m.); mountains of Kulu, alt. 4000 m., no. 17964  $\sigma$ , no. 17966  $\varphi$ , June 1929 (shrubs 1–1.5 m.).

The pubescence of the young leaves is the same in all three numbers and seems typical for the species. While the glaucous under surface is quite glabrous from the beginning or only slightly pubescent at the base, hairs are regularly present on the upper surface, though almost always restricted to the veins. It should also be noted that the young leaves after separation from the tip of the branch remains flat, while in the closely related *S. luctuosa* Lévl. they become strongly revolute at the margin.

**Salix luctuosa**  $\times$  **tenella** Goerz, n. hybr.

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4075 m., no. 16074  $\varphi$ , June 1928 (shrub 2 m.).

In its fruiting catkins this hybrid closely approaches *S. tenella* Schneid., but differs in its leaves which are strongly revolute along the margin when young and densely short-pubescent beneath. *Salix luctuosa* Lévl. and *S. tenella* seem to grow often together and there can be no doubt that hybrids between the two are not rare.

## Sect. ERIOSTACHYAE Schneider

**Salix Ernesti** Schneider in Sargent, Pl. Wilson. III. 47 (1916).—Handel-Mazzetti, Symb. Sin. VII. 77 (1929).

SOUTHWESTERN KANSU. Tao River basin: ridges of mountains west of Adjüan, alt. 3750 m., no. 12648  $\varphi$ , July 1925 (shrub 90 cm.); no. 12649  $\sigma$ , July 5, 1925 (shrub 90 cm.).

The pistillate plant also has a dorsal, though very small nectary. The young leaves are strongly revolute and only thinly pubescent and apparently quickly become glabrous.

**Salix Balfouriana** Schneider in Bot. Gaz. LXIV. 137 (1917).—Handel-Mazzetti in Symb. Sin. VII. 74 (1929).

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16070 ♀, June 1928 (tree 5 m.).

**Salix plocotricha** Schneider in Sargent, Pl. Wilson. III. 49 (1916).

? *Salix spathulifolia* Seemen in Bot. Jahrb. xxvi. Beibl. 82, p. 31 (1905).—Léveillé in Bull. Soc. Bot. France, LVI. 304 (1909).—Handel-Mazzetti, Symb. Sin. VII. 73 (1929).

SOUTHWESTERN KANSU. Tao River basin: along streams, near Adjüan, eastern Minshan, alt. 2700 m., nos. 12640 ♀, 12640a ♀, July 1925 (shrub 1.20–2.40 m.; leaves glaucous beneath); near the head of Maerkhu valley, alt. 3000 m., no. 12960 ♀, July 25, 1925 (tree 4.50–5.40 m.; leaves dark green; petioles and young shoots red; catkins reddish); near Tebbu, Shimen to Drjakana, alt. 3150 m., no. 13190 ♀, August 1925 (tree or shrub 1.80–3 m.; catkins long, greenish); Toyüku valley, slopes of Pakeshan, Minshan range, alt. 3000 m., no. 13410 (fol.), Nov. 1925 (shrub 4.50 m., branches slender; leaves dull beneath); beyond Adjüan, in forests along stream, alt. 3000 m., no. 13412 (fol.), Nov. 1925 (shrub or small tree 4.50–6 m., branches straw-colored); along banks of stream below Mt. Kuang kei, Kadjaku, Minshan, alt. 2850 m., no. 13415 (fol.), Nov. 1925 (shrub 1.80–3 m., branches ascending). Upper Tebbu country: along Kaichow stream not far from its source, south of the Minshan, alt. 3000 m., no. 12486 ♀, June 1925 (shrub 1.80–2.40 m.; leaf whitish below).

CENTRAL KANSU. Lien hoa shan: in Spruce forests and outskirts, alt. 3000 m., no. 12729 ♀, July 1925 (shrub 3 m., leaves glaucous beneath).

I was unable to decide whether Seemen's species is identical with *S. plocotricha*, since I could not examine the original. A close connection exists doubtless between the three species of the section *Eriostachyae* enumerated above. *Salix Ernesti* is distinguished from the other species chiefly by the presence of a second gland in the pistillate flower, a character which is not supposed to be constant. The specimens cited above for *S. Balfouriana* and *S. Ernesti* are very similar in the development of the leaves which are strongly revolute at first, but differ much in their pubescence, while in *S. plocotricha* the young leaves are flat and floccose-tomentose. Again similar to this is *S. Delavayana* Hand.-Mazz. which, however, has a glabrous ovary.

#### Sect. DENTICULATAE Schneider

**Salix denticulata** Andersson in Svensk. Akad. Hand. 1850, p. 481 (1851).—Klotzsch & Garcke, Bot. Ergeb. Reise Prinz. Waldemar, 119, t. 89 (1862).—Schneider in Sargent, Pl. Wilson. III. 117 (1916).

SOUTHWESTERN KANSU. Tao River basin: along lateral streams, Tao watershed, alt. 3000 m., no. 12237 ♂, June 1925 (shrub 1.80–3 m.; flowers yellow); along streams south of Minshan below Shimen, alt. 3000 m., no. 12484 ♂, June 1925 (shrub 1.50–2.40 m.).

Though this species originally described from the Himalayas has not yet been recorded from China, I have no doubt in its correct identification. The only difference would be the pubescence of the floral bracts which are described by Andersson as "obsolete puberulae," while they are on the Kansu specimens rather evenly short-pubescent. The two specimens though collected in different localities are very similar; in no. 12237 both nectaries are rather deeply divided into two narrow lobes.

#### Sect. LONGIFLORAE Schneider

##### *Salix tibetica* Goerz, spec. nov.

Frutex vel arbor ad 4.5 m. altus, ramulis novellis pubescentibus, anniculis omnino glabrescentibus, cortice gemmisque fuscis subinde parum pruinosis. Folia in petiolo puberulo 4–6 mm. longo, novella plana, utrinque glabra, costa supra brevi-tomentosiuscula subtusque parce pilosa excepta, adulta ovata vel ovato-elliptica, ca. (1:1 $\frac{3}{4}$ ) 3–4.5 cm. longa, basi rotundata, apice brevi vel triangulare, supra viridia, subtus glauca vel albida, margine sat dense crenato-dentata; stipulae 0 vel minutae, ovatae, deciduae. Amenta coaetanea, in pedunculo 2–6 mm. longo foliolis parvis 2–3 saepe caducis instructo, ♂ ovata, 1–1.5 cm. longa, 0.8 cm. crassa, densiflora, rhachi albo-pilosa; squamae ovatae, semifuscae, utrinque omnino basi criso-pilosae; nectarium singulum ovale; stamina 2, filamentis liberis  $\frac{1}{3}$  pilosis 4–5 mm. longis, antheris ovalibus aureis. Amenta fructifera crasse cylindrica, densiflora, ca. 3 cm. longa, 1 cm. crassa, rhachi squamisque ut in ♂; nectarium singulum oblongum pedicellum glabrum 0.3–0.5 mm. longum subaequans; capsula glabra, ca. 4 mm. longa, stylo ca. 1 mm. longo stigmatibus 0.5 mm. longis bilaciniatis coronato.

EASTERN TIBET. Jupar Range: Jupar streambed, alt. 3150 m., no. 14304 ♂, June 1926 (tree 3.5–4.5 m.); Jupar valley along streambed, alt. 3150 m., no. 14284 ♀, June 1926 (shrub to tree 4.5 m.).

##### *Salix juparica* Goerz, spec. nov.

Frutex altus vel arbor ad 4.5 m. alta, ramulis tenuibus, novellis pubescentibus vel subglabris, demum omnino glabris, anniculis brunneis vel fuscis. Folia recentissima plana, subtus ab initio plus minusve glabra, supra dense pilosa cito glabrescentia, costa puber-

ula excepta, adulta in petiolo puberulo 2–4 mm. longo, elliptica (ca. 1.2) vel apicalia sublanceolata (1:2½–3) 3–4 cm. longa, utroque plus minusve aequaliter angustata, supra atroviridia, subtus glauca vel albido-glaucia, margine crenulato vel interdum subintegro; stipulae 0 vel minutae, caducae. Amenta coaetanea, in pedunculo 0.4–0.8 cm. longo foliolis parvis vel squamaceis 2–3 instructo, ♂ cylindrica, ca. 2 cm. longa, 4–5 mm. crassa, densiflora, rhachi pilosa; squamae obovatae, pallidae, brevipilosae, ca. 1 mm. longae; nectarium singulum, oblongum; stamina filamentis 2 liberis ½ pilosis ca. 3 mm. longis, antheris subglobosis aureis. Amenta ♀ crasse cylindrica, ad 2.5 cm. longa, 9 mm. crassa, densiflora, fructifera ad 6 cm. longa, rhachi pilosa; squamae obovatae, semifuscae, puberulae, ca. 1 mm. longae; nectarium singulum oblongum, pedicellum ½ mm. longum plus minusve aequans; germen cinereo-pilosum ca. 5 mm. longum in stylum 0.5 mm. longum paulatim attenuatum, stigmatibus 0.5 mm. longis bilobatis plus minusve conniventibus.

EASTERN TIBET. Jupar Range: Jupar streambed, alt. 3150 m., no. 14303 ♀, June 1926 (tree 3.6–4.5 m.); Jupar valley along streambed, alt. 3150 m., no. 14283 ♀, June 1926 (tree 4.5 m.). Radja and Yellow River gorges: in streambed at Dachso canyon, north of Radja, alt. 3150 m., no. 14085 ♀, June 2 1926 (shrub 3–4.5 m.); northern slopes of river valley mountains opposite Radja, alt. 3150 m., no. 14001 ♂, May 27, 1926 (shrub 2.40–3 m.).

The specific differences between *S. juparica* and *S. tibetica* are not yet quite clear. The pistillate specimen of *S. tibetica* differs in the oval leaves and the glabrous capsules from the pistillate *S. juparica*. The stamineate *S. tibetica* (no. 14304), however, also resembles *S. juparica* (no. 14303), together with which it apparently had been collected. It is not impossible that the latter is a hybrid. Further material is needed to arrive at a clear understanding.

***Salix hypoleuca* Seemen var. *kansuensis* Goerz, var. nov.**

Differt a typo foliis subtus pallide viridibus (non glaucis), pedunculis foliis normalibus ceteris paulo minoribus instructo.

SOUTHWESTERN KANSU. Upper Tebhu country: south of Minshan range, along streams, alt. 2900 m., no. 12440 ♂, June 1925 (shrub or small tree 4.5 m.; catkins yellow); south of Minshan range near Tongwa, along streams, alt. 2900 m., no. 12441 ♀, June 1925 (shrub 1.80–2.40 m.); southern slopes of Minshan, along bank of mountain stream, alt. 3200 m., no. 12500 ♀, June 1925 (shrub 1.20–1.80 m.).

**Salix Rockii** Goerz, spec. nov.

Frutex ad 3 m. altus, ramulis sat longis saepe divaricatis, novellis pubescentibus, anniculis omnino glabris brunneis saepe subnitentibus; gemmae semiconicae, acutae, glabrae, nitidae. Folia juvenilia plana, subtus pilis longis acroscopicis sparse, supra pilis brevibus sparsissime obsita, mox glabra, subtus pallida vel subalbida, elliptica, ca. 1.5 cm. longa, margine minute denticulata, petiolo 1–2 mm. longo puberulo; folia matura desunt; stipulae 0. Amenta coae-tanea, in pedunculo brevissimo 2 vel 3 foliolis vulgo sat magnis instructo, ♂ ovato-cylindrica, 2 cm. longa, 1 cm. crassa, densiflora, rhachi pilosa; squamae obovatae antice fuscatae, longe albo-bar-batae; nectarium singulum (vel dorsale minutum) rectangulum; stamina 2 filamentis liberis  $\frac{1}{2}$  pilosis. Amenta ♀ crasse-cylindrica, 1.5–2 cm. longa, 8 mm. crassa, rhachi et squamis ut in ♂; squamae interdum pallidae; nectarium rectangulum pedicellum brevissimum subaequans; germen anguste conicum, 2 mm. longum, griseo-pilosum vel albo-tomentosum, in stylum 1 mm. longum fuscum attenuatum, stigmatibus 0.4 mm. longis plus minusve divisis divaricatis.

**EASTERN TIBET.** Radja and Yellow River gorges: Radja gomba, on rocky cliffs with Junipers, alt. 3300 m., nos. 13928 ♂ and 13929 ♂, May 20, 1926 (shrub 2.40–3 m.); valley of Nyavruch north of Radja, lateral valley, along streambed, no. 13931 ♀, May 27, 1926 (shrub 1.20–1.80 m.); with Willows on rocky and grassy slopes above Yellow River gorge, alt. 3300 m., no. 13943 ♀, May 27, 1926 (shrub 1–1.20 m.); valley of Nyavruch northwest of Radja, and rocky streambed, alt. 3300 m., no. 13944 ♂, May 27, 1926 (shrub 2.40–3 m.); among spruce forest southwest of Yellow river opposite Radja, alt. 3450 m., no. 13957 ♀, May 24, 1926 (shrub 1.80 m.); same locality, alt. 3300 m., no. 13959 ♂, May 24, 1926 (shrub 2.40–3 m.).

This species resembles in its floral characters *S. oritrepha* Schneid., but differs clearly in its nectaries and in the finely serrate leaves.

**Salix cereifolia** Goerz, spec. nov.

Frutex ad 1.80 m. altus, ramulis sat tenuibus brevibus divari-catis, novellis sparse pubescentibus, anniculis glabris brunneis opacis vel sat nitentibus; gemmae glabrae, brunneae. Folia novella (adulta desunt) in petiolo brevi, plana, oblonga, utroque aequaliter angustata, ca. 1.5 cm. longa, utrinque glabra, supra viridia, subtus cereo obducto glauca, integra; stipulae 0. Amenta coaetanea, ♂ subsessilia, bracteofoliis squamaceis deciduis suffulta, anguste cylindrica, 1.5–2 cm. longa, 0.5 cm. crassa, densiflora, rhachi brevi-pilosa; squamae obovatae, pallidae, subglabrae; nectarium 1,

minutum, ovale; stamina 2, filamentis liberis glabris ca. 2 mm. longis squamas haud multo superantibus, antheris ovalibus aureis. Amenta ♀ tantum statu maxime juvenili adsunt, 5 mm. longa, simili figura ut in ♂ videntur; squamae glabrae, pallidae; nectarium 1, germen sessile, breviconicum, glabrum, stylo stigmatibusque brevibus.

SOUTHWESTERN KANSU. Tao River basin: mountains of Choni, in forests and banks of streams, alt. 3000 m., no. 12115 ♀, May 1925 (shrub 1.50–1.80 m.); mountains of Choni, alt. 2700 m., no. 12123 ♂, May 1925 (shrub 1.50–1.80 m.).

Resembles in its habit *S. tenella* Schneid., but differs in the staminate flowers having only one nectary and in the leaves being glabrous from the beginning.

#### Sect. DIPLODICTYAE Schneider

**Salix Faxoniana** Schneider in Bot. Gaz. LXIV. 143 (1917).—Handel-Mazzetti in Symb. Sin. VII. 82 (1929).

SOUTHWESTERN SZECHUAN (Muli): alpine meadows, Mount Mitzuga, west of Muli Gomba, alt. 4000 m., no. 16054 ♂, June 1928 (shrub 1 m.), mountains of Kulu, in gravelly streambed, alt. 4150 m., no. 17951 ♂, June 1929 (prostrate shrub).

The plants agree well with the male type of the species (Rock no. 4473) described by Handel-Mazzetti (l. c.).

#### Sect. BERBERIFOLIAE Schneider

**Salix flabellaris** Andersson in Svensk. Vetensk. Akad. Handl. 1850, p. 497 (1851); in Jour. Linn. Soc. IV. 54 (1860); in De Candolle, Prodr. XVI. pt. II. 295 (1868).—Schneider in Sargent, Pl. Wilson. III. 142 (1916).

SOUTHWESTERN KANSU. Upper Tebbu country: foot of Shimen, alt. 3600 m., no. 13059 ♀, July–August 1925 (prostrate shrub covering boulders and grassy slopes; catkins green).

SOUTHWESTERN SZECHUAN: Mount Konka, Risonquemba, Konkaling, alt. 3690–5335 m., no. 16869 ♀, June–August 1928 (prostrate shrub).

#### **Salix flabellaris** f. **spathulata** Andersson, l. c.

SOUTHWESTERN KANSU. Upper Tebbu country: foot of Shimen, alt. 3600 m., no. 13058 ♀, July–August 1925 (prostrate shrub growing perfectly flat, covering boulders and grassy slopes; catkins red).

#### Sect. LINDLEYANAЕ Schneider

**Salix Lindleyana** Wallich apud Andersson in Svensk. Vetensk. Akad. Handl. 1850, p. 499 (1851); in Jour. Linn. Soc. IV. 56 (1860); in De Candolle, Prodr. XVI. pt. II. 296 (1868).—Schneider in Sargent, Pl. Wilson. III. 145 (1916).

*Salix Souliei* Seemen in Fedde, Rep. Spec. Nov. III. 23 (1906).—Schneider in Sargent, Pl. Wilson. III. 62 (1916).

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16567 ♂, June 1928 (prostrate shrub); Minya Konka Snow Range, south of Tatsienlu, alt. 4660 m., no. 17529 ♂, July 1929 (prostrate shrub).

This apparently very polymorphous species is best to be compared with the European *S. retusa* L. The delimitation of the species united by Schneider under the section Lindleyanae is mostly rather uncertain and apparently further reductions will be necessary; shape and size of leaf, its margin and color of the under surface are often very variable in the same species, as it is the case in *S. retusa*.

### Sect. GLAUCAE Fries

**Salix opsimantha** Schneider in Sargent, Pl. Wilson. III. 63 (1916).

SOUTHWESTERN SZECHUAN: Chiu-Lung-Hsien Territory, east of the Yalung River, alt. 3080 m., no. 16435 ♂, May 1929 (tree 3–5 m.; fls. rich pink with purplish tinge).

The plant agrees very well with Schneider's description. It resembles *S. Faxoniana*, as already stated by Handel-Mazzetti (Symb. Sin. VII. 82) but is readily distinguished by its tall habit, even tree-like in the specimen cited above.

**Salix Ernesti × opsimantha** Goerz, hybr. nov.

SOUTHWESTERN SZECHUAN: Mount Konka, Risonquemba, Konkaling, alt. 3960–5335 m., no. 16833 ♀, August 1928 (shrub 3–4 m.); Muli, mountains of Kulu, east of Muli Gomba, alt. 3650–4425 m., no. 16437 ♀, June 1928 (shrub 60–90 cm.).

No. 16833 differs from *S. opsimantha* Schneid. which it resembles according to Schneider's description, chiefly in the crenate leaves, the two nectaries (the ventral one twice as long as the dorsal one), entire or parted and in the tomentose fruit. The two latter characters indicate *S. Ernesti* as the second parent. No. 16437 is still closer to *S. opsimantha*, since it has only one long nectary and the ovary only slightly pubescent above the middle.

**Salix pseudospissa** Goerz, spec. nov.

Frutex 0.90–1.50 m. altus, ramulis brevibus crassis nodosis, novellis ab initio glabris, anniculis fuscis vel sordidis; gemmae semi-conicae, adpressae, acutatae, argute carinatae, glaberrimae, fuscae. Folia in petiolo 3–6 mm. longo glabro, novella utrinque glaberrima (costa inclusa), plana, adulta obovata 3–5 cm. longa, apice brevi, basi rotundata, nervis primariis 8–10, reticulo utrinque obsolete elevato, supra atroviridia, subadiposa, subtus albida, margine anguste denticulato; stipulae 0. Amenta coaetanea, brevipedunculata, foliis 2–3 normalibus parvis suffulta, percrasse cylindrica, ad 3 × 1 cm. (fructu ad 5 cm.), rhachi crassa parce pilosa; squamae magnae (ad 2 × 6 mm.), obovatae, fuscae, venulosae, utrinque brevissime criso-pilosae, dorso glabrescentes; nectarium singulum, oblongum, 0.6 mm. longum; stamina 2, ca. 12 mm. longa, filamentis liberis  $\frac{1}{2}$  pilosis, antheris ovatis flavidis. Amenta ♀ rhachi et squamis ut in ♂, squamis ex parte latioribus (3 mm.) antice saepe crenulatis; nectaria singula vel bina, ventrale ampullaceum, ad 0.8 mm., dorsale 0.5 mm. longum; pedicellus brevissimus nectarium dorsale aequans; germen anguste conicum, 3–4 mm. longum, squama occul-

tatum, subrufo-tomentosum, in stylum fuscum plus minusve 1.5 mm. longum maxima ex parte fissum attenuatum, stigmatibus 0.6 mm. longis bipartitis laciniis filiformibus erecto-patentibus.

**SOUTHWESTERN KANSU.** Tao River basin: Mt. Kuang ke shan, along mountain torrents, alt. 3600 m., no. 12362 ♀, June 1925 (shrub 1.2–1.5 m., catkins rich yellow); Minshan range, below pass of Mt. Kuang kei, alt. 3600 m., no. 12410 ♂, June 1925 (shrub 1.2 m. or less; flowers and catkins a rich yellow); Mt. Kuang Kei, trail to Djrakana, Minshan, among Rhododendron, alt. 3750 m., no. 13414 (fol.), Nov. 1925 (shrub 1.2–1.5 m.; branches stiff, thick; leaves pale beneath).

**CENTRAL KANSU.** Lien hoa shan: alpine regions; alt. 3300 m., no. 12725, July 1925 (shrub 1.5 m., leaves glaucous beneath).

This species differs from *S. spissa* Anderss. found in the Tienshan and Altai Mountains chiefly in the large less pubescent floral bracts and the partly double nectary. It is to be expected that occasionally also in the staminate flower a dorsal nectary may occur. Also the very close serrature and the perfectly glabrous branches of leaves should be noted.

**Salix Delavayana** Handel-Mazzetti in Symb. Sin. VII. 78 (1929).

**SOUTHWESTERN SZECHUAN** (Muli): mountains south of Muli, Mount Gibboh, alt. 3050–3960 m., no. 17238 ♂, May 1928 (shrub 2–3 m.); mountains of Kulu; alt. 4000–4300 m., no. 17952 ♂, no. 17953 ♀, no. 17965 ♂, no. 18095 ♂, June–July 1929 (shrub 0.60–1.50 m.).

Those numbers in which the catkins and leaves are just expanding, show much resemblance to *S. spodiophylla* Hand.-Mazz. (op. cit. 77), which is possibly a hybrid with *S. Delavayana* as one of the parents.

#### Sect. CAPREAE Dumortier

**Salix Wallichiana** Andersson in Svensk. Vetensk. Akad. Handl. 1850, p. 477 (1851); in Jour. Linn. Soc. IV. 50 (1860); in Svensk. Vetensk. Akad. Handl. IV. 80, tab. 5, fig. 46 (Monog. Salic.) (1867); in De Candolle, Prodr. XVI. pt. II. 223 (1868).—Schneider in Sargent, Pl. Wilson. III. 64 (1916).—Handel-Mazzetti, Symb. Sin. VII. 87 (1929).

**SOUTHERN KANSU:** mountains of Pikou and Mosuping, alt. 1200 m., no. 12066 ♂, April 1925 (shrub 1.5–1.8 m.).

**SOUTHWESTERN KANSU.** Tao River basin: mountains of Choni, west of Tao river, Picea forest, alt. 3000–3150 m., no. 12125 ♀, no. 12126 ♂, no. 12128 ♂, May 1925 (tree 4.50–5.40 m.); Choni, banks of mountain streams west of Taoho, alt. 2850 m., no. 12135 ♀, May 1925 (shrub 1.5 m.); mountains west of Choni, alt. 3000 m., no. 12136 ♂, May 1925 (shrub or small tree 4.5 m.); along banks of Choni river, near bridge, alt. 2520 m., no. 12305 ♀, June 1925 (tree 4.5–6 m., often shrubby).

WESTERN SZECHUAN: above Ching chuan mountains along stream, alt. 1800 m., nos. 12045 ♀, no. 12047 ♂, no. 12048 ♂, April 1925 (tree or shrub 1.80-3 m.).

**Salix pseudo-Wallichiana** Goerz, spec. nov.

Frutex excelsus vel arbor ad 6 m. alta, ramulis sat tenuibus novellis pubescentibus vel albo-villosulis, anniculis, subglabris brunneis vel fuscis; gemmae conicae, brunneae, glabrae. Folia in petiolo puberulo 4-6 mm. longo, utrinque pilis brevibus adpressis sparse obducta, plana, adulta glabra vel costa puberula, late ovato-elliptica, apice brevi (1:1½-2), apicalia ovato- vel obovato-lanceolata, apice subproducto (ca. 1:3), 3-5 cm. longa, supra opaco-viridia, subtus glauca, nervis primariis 7-10, reticulo vix conspicuo subtus parum elevato, margine integro vel in foliis apicalibus irregulariter dentato. Stipulae 0 vel parvae, semicordatae. Amenta coaetanea vel subcoaetanea in pedunculo brevissimo vel in ♀ ad 7 mm. longo, bracteis squamaceis caducis suffulta, ♂ ovata, ca. 2 cm. longa, 1.5 cm. crassa, densiflora, rhachi pilosa; squamae anguste obovatae, ca. 0.6 × 1.8 mm., antice subatrae, longe albo-barbatae; nectarium oblongum, 0.5 mm. longum; stamna filamentis 2 liberis ½ pilosis, 6 mm. longis, antheris ovalibus aureis. Amenta ♀ crasse cylindrica, ad 3.5 cm. longa, 1.5 cm. crassa, densiflora; squamae et nectarium ut in ♂; pedicellus nectarium aequans vel triplo superans, pilosus; germen anguste conicum, 4.5 mm. longum, stylo 0.4-0.6 mm. longo, stigmatibus 0.6 mm. longis, divisus, laciniis tenuibus, patentibus. Valvae capsulae post dehiscentiam parum recurvatae.

EASTERN TIBET. Grasslands between Labrang and Yellow River: in Serchen leading to Yellow River between Dzangar and Radja Gomba, no. 13917 ♂, May 15, 1926 (shrub 3-4.5 m., flowers golden yellow). Jupar Range: streambed of Jupar valley, alt. 3150 m., no. 14287 ♀, June 1926 (tree 4.5-6 m.). Radja and Yellow River gorges: along streambed and outskirts of spruce forest in Dachso Canyon, north of Radja, alt. 3150 m., no. 14077 ♀, June 2, 1926 (shrub 3 m.).

The catkins and all parts of the flower are more graceful than in *S. Wallichiana* Anderss., the filaments are pubescent, the pedicel short or very short, the style longer and the leaves broader. The latter resemble much the type of *S. livila* Wahlg. which, however, has very long pedicels. One could almost take these plants for hybrids of *S. Wallichiana* with *S. Rockii* Goerz, but the former has not been collected in Eastern Tibet by Rock or by any one else.

Sect. INCUBACEAE Dumortier

**Salix sibirica** Pallas, Fl. Ross. I. pt. II. 72, t. 81, fig. 3 (1788).—Schneider in Sargent, Pl. Wilson. III. 154 (1916).

EASTERN TIBET. Radja and Yellow River gorges: valley of Nyavruch north of Radja, lateral valley, along rocky streambed, no. 13932 ♂, May 27, 1926 (shrub 1.8–2.4 m.).

SOUTHERN KANSU: mountains of Motzung and Pikou, along stream, no. 12071 ♂, April 1925 (shrub 1.2 m.).

SOUTHWESTERN KANSU. Tao River basin: Minshan range, ravines of Kadjaku, alt. 3150 m., no. 12379 ♂, June 1925 (shrub 2.4–3 m.); Minshan range, slopes of Kadjaku valley below Kuang ke, alt. 3000 m., no. 12420 ♂, June 1925 (shrub 3 m.; catkins yellow).

CENTRAL KANSU. Lien hoa shan: swampy alpine meadows, alt. 2850–3000 m., no. 12685 ♀, July 14–20, 1925 (shrub 60–90 cm., often 30 cm.; leaves silvery), no. 13420 (fol.), Nov. 1925 (shrub 1.2–1.8 m.; leaves silvery tomentose on both sides).

*Salix sibirica* is new for China; the specimens, however, are not all typical. Very characteristic is the pistillate plant from central Kansu which could even be taken for the European *S. repens* L., if it had longer pedicels. On account of its short pedicels it belongs to var. *subsessilis* (Regel) Goerz (*S. repens* var. *subsessilis* Regel). The two numbers from southwestern Kansu recall forms from the Pamir which constitute a distinct species (*S. schugnanica* Goerz, adhuc ined.), but are not identical with it. Owing to the lack of fully grown leaves a definite conclusion cannot be reached. The filaments are glabrous in all numbers.

***Salix juparica* × *sibirica* Goerz, hybr. nov.**

EASTERN TIBET. Radja and Yellow River gorges: valley of Nyavruch north of Radja, lateral valley, along rocky streambed, no. 13933 ♂, May 1926 (shrub 3–4.5 m. branching from base; flowers yellow).

This hybrid was found at the locality cited with both parents. It resembles *S. sibirica* Pall., but differs in the somewhat slenderer catkins, the slightly pubescent filaments and in the scarcely pubescent unfolding leaves.

**Sect. VIMINALES Bluff & Fingerhuth**

***Salix Rehderiana* Schneider in Sargent, Pl. Wilson. III. 66 (1916).**

SOUTHERN KANSU: mountains between Motzung and Pikou, along streambeds, no. 12070 ♀, April 1925 (shrub 1.5–1.8 m.).

The catkins of the specimen are still very young, but according to the floral characters (pedicel and ovary glabrous; style long, stigmas short, pedicel very short) it can hardly be referred to any other species.

**Salix Rehderiana** Schneid. var. **brevisericea** Schneider l. c. 67.

EASTERN TIBET. Grasslands between Labrang and Yellow River: Gochen valley near mouth at Yellow River gorge south of Dzang lamassery, alt. 3060 m., (?) no. 13912 ♀, May 14, 1926 (shrub 1.6–2.4 m.). Radja and Yellow River gorges: rocky slopes back of Radja, alt. 3300 m., (?) no. 13925 ♂, May 20, 1926 (shrub 1.6–2.4 m.); valley of Nyavruch north of Radja, lateral valley, along rocky streambeds, no. 13934 ♀, May 27, 1926 (shrub 2.4–3 m.). Jupar Range: Jupar streambed, alt. 3150 m., nos. 14305 ♀, and 14306 ♂, June 1926 (tree 3–4.5 m.); along streambed in upper Jupar valley, alt. 3600 m., no. 14350 ♀, June 1926 (shrub 3–3.6 m.).

SOUTHWESTERN KANSU. Upper Tebbu country: along banks of mountain streams, southern slopes of Minshan, alt. 3180 m., no. 12501 ♀, June 1925 (shrub 1.8–2.4 m.). Tao River basin: forests of Shiaoku, among Larches, Birches, Spruce, alt. 3000 m., no. 12816 ♀, July 1925 (shrub 2.4–3.6 m.). Lower Tebbu country: along stream of Mayaku in Abies forest, alt. 3000 m., no. 14962 (fol.), Oct. 1926 (shrub 3–4.5 m., with ascending branches; leaf dull green above, pale beneath).

CENTRAL KANSU. Lien hoa shan: among alpine scrub and on edge of forests, alt. 3450 m., no. 12785 ♀, July 1925 (shrub 1.2 m.); same locality alt. 2850 m., no. 13419 (fol.), Nov. 1925 (shrub 1.8–2.4 m., branches blackish; leaves dark green, glossy above, glaucous beneath).

The variety with pubescent ovary seems to be the most common in the region. No. 13934 resembles very much the plant distributed under no. 644 by Toepffer in his *Salices exsiccatae*. I cannot see any evidence of a relationship between var. *brevisericea* and *S. myrtillacea*, as suggested by Schneider (l. c.). Nevertheless one of the two forms, the one with glabrous or the one with pubescent ovary may turn out to be a hybrid. No. 13925 has its buds just opening and therefore its identification is not quite certain. No. 13925 may possibly be a hybrid of *S. Rehderiana* and  $\times$  *S. taoensis* Goerz as the thicker very precocious catkins suggest.

## Sect. HELIX Dumortier

**Salix Wilhelmsiana** Marshall von Bieberstein, Fl. Taur.-Caus. III. Suppl. 627 (1819).—Schneider in Sargent, Pl. Wilson. III. 169. (1916).—Fedtschenko, Consp. Fl. Turk. VI. 326. (1916).—Goerz in Grossheim, Fl. Kauk. II. 10 (1930); in Fedde, Rep. Spec. Nov. XXVIII. 129 (1930); Salic. Asiat. I. 16, no. 17 (1931).

*Salix angustifolia* Willdenow, Sp. Pl. IV. 699. (1805).—Stschégléew in Bull. Soc. Nat. Moscou, XXVII. pt. I. 196 (1854).—Boissier, Fl. Orient. IV. 1187 (1879).

*Salix angustifolia* var. *eriocarpa* Ledebour, Fl. Ross. III. 604 (1850).  
*Salix dracunculifolia* Boissier in Kotschy, Pl. Pers. austr. no. 621; Diagn. I. 99 (1846).—Boissier et Buhse, Herb. Pers. I. 201, sec. Andersson.—Trautvetter in Act. Hort. Petrop. IX. 176 (1884).

EASTERN TIBET. Radja and Yellow River gorges: valley of Nyavruch, north of Radja, lateral valley, along streambed, nos. 13936 ♀ and 13937 ♂, May 27, 1926 (shrub 1.20 m.); north of Radja, Yellow River valley, alt. 3150 m., nos. 14031 ♀ and 14032 ♂, May 28, 1926 (shrub 1.20–1.80 m.). Ba valley: along stream, alt. 3000 m., no. 14262 ♀, June 1926.

SOUTHWESTERN KANSU. Tao River basin: Choni, banks of Tao river, alt. 2460 m., no. 12107 ♂, May 1925.

The specimen from Tibet agrees with the type of the species, only 13936 has somewhat longer styles, possibly due to the influence of *S. myrtillacea*. The specimen from Kansu is not yet sufficiently developed but seems to belong also to the type.

*Salix cheilophila* Schneider in Sargent, Pl. Wilson. III. 69 (1916).—Handel-Mazzetti, Symb. Sin. VII. 87 (1929).

SOUTHWESTERN SZECHUAN (Muli): Muli and Litang River valley, near Muli Gomba, alt. 2600–3000 m., no. 16119 ♀, May 1928 (shrub or small tree).

*Salix myrtillacea* Andersson in Jour. Linn. Soc. IV. 51 (1860).—Schneider in Sargent, Pl. Wilson. III. 71 (1916).—Handel-Mazzetti in Symb. Sin. VII. 89 (1929).

*Salix subpycnostachya* Burkhill in Jour. Linn. Soc. XXVI. 532 (1899).—Léveillé in Bull. Soc. Bot. France, LVI. 301 (1909).

*Salix squarrosa* Schneider in Bot. Gaz. LXIV. 142 (1917).

EASTERN TIBET. Radja and Yellow River gorges: rocky slopes back of Radja, alt. 3300 m., no. 13927 ♂, May 20, 1927 (shrub 1.80–2.40 m.); rocky and grassy slopes above Picea forest, northern slopes Yellow River southwest of Radja, alt. 3600 m., no. 13967 ♂, May 25, 1926 (shrub 0.60–1 m.); alpine regions south of river, opposite Radja, alt. 3600 m., no. 13997 ♀, May 27, 1926 (shrub 1–1.2 m.); valley of Nyavruch north of Radja, alt. 3300 m., no. 14039 ♂, May 31, 1926 (shrub 1.20–1.50 m.).

SOUTHWESTERN KANSU. Tao River basin: mountains west of Choni, alt. 3000 m., no. 12137 ♂, May 1925 (shrub 60–90 cm.; flowers red as is the whole plant); Minshan range, southwest of Choni on slopes and alpine meadows, alt. 3300 m., no. 12359 ♂, June 1925 (shrub 0.90–1.20 m.; catkins grey); ravines of Kwadjaku, alt. 3150 m., no. 12378 ♀, June 1925 (shrub 1.50–1.80 m.); along river, near Choni, no. 13402 (fol.), Nov. 1925 (shrub or small tree 2.10–3 m.); valley of Maerhku, Minshan range, alt. 2700 m., no. 13407 (fol.), Nov. 1925 (shrub 1.50–2.40 m.; much branched, leaves white beneath), no. 13408 (fol.), Nov. 1925 (shrub 1.20–1.80 m., much branched; leaves green beneath); among rocks and alpine

meadows, Toyüku, Minshan, Pakeshan, alt. 3450 m., no. 13411 (fol.), Nov. 1925 (shrub 90 cm., compact). Upper Tebbu country: Djrakana, southwest of Minshan, outskirts of Abies forest, alt. 3000 m., no. 13417 (fol.), Nov. 1925 (shrub 1.80–2.40 m., branches bronze color; leaves papery, glaucous beneath), no. 13418 (fol.), Nov. 1925 (shrub 1.50–1.80 m.; leaves glaucous beneath).

SOUTHWESTERN SZECHUAN (Muli): mountains south of Muli, Mount Gibboh, alt. 3050–3960 m., no. 16823 ♀, May 1928 (shrub 2–3 m.); Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16096 ♀, June 1928 (shrub 1–2 m.); Minya Konka Snow Range, south of Tatsienlu, alt. 4600 m., no. 17526 ♀, July 1929; Mount Siga, northeast of Kulu, alt. 4300–4450 m., no. 17887 ♀, June 1929 (shrub 1.50 m.), no. 17889 ♂ (shrub 0.90–1.20 m.).

The specimens from Szechuan are generally more vigorous and have larger and thicker catkins than those from Kansu and Eastern Tibet, but do not differ otherwise. The sometimes peculiar habit which induced Schneider to propose *S. squarrosa* as a distinct species, is seen also in Tibetan specimens (e. g. no. 13927). It is probably only a monstrosity and may be due to injuries by grazing animals, insects or climate. Some of the numbers cited show perhaps traces of hybridization, particularly with *S. Wilhelmsiana*, but it is hardly possible to give a more exact interpretation of these forms lacking either leaves or flowers.

***Salix myrtillacea* × *Wilhelmsiana* (*S. taoensis*) Goerz, hybr. nov.**

EASTERN TIBET. Grasslands between Labrang and Yellow River: Gochen valley near mouth at Yellow River, south of Dzangar lamassery, alt. 3060 m., nos. 13909 ♂, and 13911 ♀, May 14, 1926 (shrub 3 m.); rocky gorge of Serchen leading to Yellow River gorge, southeast of Radja, alt. 3120 m., no. 13915 ♂, May 14, 1926 (shrub 2.40–3 m.). Radja and Yellow River gorges: rocky slopes back of Radja Gomba, alt. 3300 m., no. 13921 ♂, May 20, 1926 (shrub 3 m., branching from near base); valley of Nyavruch north of Radja, lateral valley, along rocky streambed, no. 13930 ♀, May 27, 1926 (shrub 1.80–2.40 m.); north of Radja, Yellow river valley, alt. 3150 m., no. 14033 ♀, May 28, 1926 (shrub 3–3.6 m.).

SOUTHWESTERN KANSU. Tao River basin: forest of Choni, along Tao river, no. 12099 ♂, May 1925 (shrub 2.40–3 m.); Choni, banks of Tao river, alt. 8200 m., May 1925, nos. 12103 ♂ (shrub 1.5 m.), 12104 ♂ (shrub 1.2 m.) and 12105 ♀ (shrub 1.5–1.8 m.); mountains of Choni, Picea forest outskirts, alt. 2700 m., no. 12106 ♀, May 1925 (shrub 1.8–2.4 m.); southern bank, Choni, no. 12265 ♀, June 1925 (shrub 1.5–1.8 m.). Minshan range: in ravines of Kadjaku, alt. 3150 m., no. 12377 ♀, June 1925 (shrub 1.8–3 m.; catkins small grey); Choni, alt. 2550 m.,

Nov. 1925, nos. 13401 (fol.) (shrub 1.5 m., much branching), 13403 (ram.) (shrub 1.5–2.4 m., branches red, branchlets pubescent), 13404 (fol.) (shrub 1.5–2.4 m., branches red, pubescent; leaves pubescent on both sides), 13405 (fol.) (shrub 1.2–1.5 m., branches dark red, leaves white beneath) and 13406 (fol.) (shrub 2.4–3 m., branches green); Kadjaku, along stream, alt. 2240 m., no. 13416 (fol.), Nov. 1925 (shrub 1.5–1.8 m., branches stiff, blackish; leaves green beneath). Lower Tebbu country: along stream near Nyiba, alt. 2550 m., no. 14963 (fol.), Oct. 1926 (shrub 3–4.5 m.; leaves bluish grey beneath).

This hybrid is in localities where the two parent species occur, apparently not only very frequent, but also exceedingly polymorphous. On account of the incompleteness of the material it is not always possible to draw the lines between them and the parents. One may assume that the hybrid is fertile and that by recrossing with the parent the limits become indistinct. Thus e. g. no. 12105 is very near *S. Wilhelmsiana* and also no. 13911 with its slender catkins may represent a recrossing with *S. Wilhelmsiana*, while others might be interpreted as forms of *S. myrtillacea*. Not rare seems to be a combination of the staminate catkins which resembles those of the European *S. purpurea* (e. g. nos. 12099 and 12103) or those of its Caucasian variety *virescens* Anders. (no. 12104). Likewise the shape of the leaves changes from narrow-ob lanceolate to narrow obovate. No. 14963 has leaves resembling those of *S. tenuijulis* Ledeb. which ranges from the Tianshan to Armenia; the leaves, however, differ from that species not only slightly in the serration, owing to the influence of *S. Wilhelmsiana*, but also lack completely the stipules which are so characteristic for *S. tenuijulis*. Besides the leaves are in October still furnished on both sides with the long acroscopic hairs of *S. Wilhelmsiana*. No. 12265 represents a somewhat intermediate leaf shape, broad-lanceolate to ob lanceolate with short point; the serration extends here in contrast to *S. myrtillacea* almost to the base and the pubescence is lacking entirely on the mature leaves. The hybrids show also in habit an intermediate character. While *S. Wilhelmsiana* generally attains only a height of 1.6 m., *S. myrtillacea* grows into a shrub up to 4 in. tall. Among the hybrids shrubs up to 3 m. are found.

***Salix myrtillacea* × *Rockii* Goerz, hybr. nov.**

EASTERN TIBET. Radja and Yellow River gorges: alt. 3150 m., no. 13953 ♂, May 25, 1926 (shrub 2.4–3 m.); with Spruces on northern slopes of valley south of Yellow River, opposite Radja, alt. 3150 m., no. 14112 ♀, June 10, 1926. Jupar Range:

along streambed in upper Jupar valley, alt. 3600 m., no. 14349 ♀, 1926 (shrub 1.8–2.4 m.).

In the male plant the filaments are mostly connate and besides often villous up to the apex. Nos. 14112 and 14349 have well developed leaves which are about intermediate between the parents; they are densely denticulate almost to the base. In no. 13112 the longer, parted and somewhat spreading stigmas indicate the influence of *S. Rockii*. In no. 14349 perhaps *S. Wilhelmsiana* is involved besides *S. Rockii*, as suggested by the comparatively small fruiting catkins.

**Salix Delavayana × myrtillacea** Goerz, hybr. nov.

SOUTHWESTERN SZECHUAN (Muli): Mount Mitzuga, west of Muli Gomba, alt. 3050–4875 m., no. 16038 ♂, June 1928 (shrub 2 m.).

This Willow resembles *S. Delavayana* but differs chiefly in the lack of the dorsal nectary (the ventral one being nearly 1 mm. long) and the mostly  $\frac{1}{2}$ – $\frac{2}{3}$  connate filaments. The floral bracts are long and densely bearded. Perhaps *S. spodiophylla* Hand.-Mazz. belongs partly to this hybrid.

Sect. INCERTA

**Salix Alfredi** Goerz, spec. nov.

Frutex vel arbor ad 4.5 m. alta, ramulis tenuibus, recentissimis laxe pilosis citissime glabris, anniculis vetustioribusque brunneis vel fuscis, opacis vel rarius nitidulis; gemmae semiconicae, obtusae, glabrae, brunneae. Folia in petiolo piloso 3–5 mm. longo, recentissima plana, utrinque laxe sericea (subtus pilis longis laxis acroscopicas, supra pilis brevioribus), postea utrinque glabrescentia (costa ventrali, ut videtur, persistentius puberula), ovato-lanceolata, ca. 1:2½, basi rotundata, apice plus minusve triangulari, supra opace viridia, subtus pallide vel caesio-glaуa, integra; stipulae 0. Amen-ta (♀ tantum nota) coaetanea, subsessilia, bracteis minutis caducis suffulta, anguste cylindrica, gracilia, 3–4 cm. longa, 2–3 mm. crassa, postea ad 5.5 cm. longa, 6 mm. crassa, laxiflora, rhachi albo-hirsuta; squamae obovatae, ca. 0.7 × 1 mm., subbrunneae, utrinque dense sat breviter albo- vel subrufo-hirsutae; nectarium ventrale minutum (0.3–0.4 mm. longum), oblongum, dorsale; pedicellus brevissimus (brevior quam nectarium) vel nullus; germen minutum (ca. 1 mm. longum), conicum, acutatum, breviter albo-pilosum, stylo subnullo, stigmatibus 0.2 mm. longis plus minusve lobatis divaricatis vel suberectis; capsula ad 2 mm. longa, parcius pilosa.

SOUTHWESTERN KANSU. Tao River basin: mountains of Choni, west of Taoho, alt. 3000 m., May 1925, nos. 12147 (fol.) (shrub 1.5–2.4 m.), 12149 ♀ (shrub 2.4–3 m., outskirts of *Picea* forest). Upper Tebbu country: in limestone gorges en route to Tebbu land, southern slopes of Minshan, alt. 3300 m., no. 12522 ♀, June 1925 (shrub or small bushy compact tree 4.5 m.).

Nearest to this graceful Willow in habit is perhaps *S. hyلونома* Schneid., which differs in the denticulate leaves, the dense-flowered catkins, the long narrow nectary, the parted style and, as it seems, also in the larger size of all its parts. The young catkins of *S. Alfredi* are also similar in appearance to those of *S. heterochroma* Seemen, but also these are dense-flowered and have entirely different styles and stigmas and besides longer pedicels. Owing to the lack of staminate flowers, it does not seem possible to refer this new species to any of the sections.

The species is named in honor of Alfred Rehder, Curator of the Herbarium of the Arnold Arboretum.

Page 38

#### POLYGONACEAE

**Polygonum Auberti** L. Henry.—Add the following number:

SOUTHWESTERN KANSU. Tao River basin: along stream between Taochow and Kan-ku, alt. 2450 m., no. 13210, Aug. 1925 (huge climber forming dense masses; flowers cream-colored).

Page 39

#### RANUNCULACEAE

**Clematis aethusifolia** Turcz.—Add the following no.:

CENTRAL KANSU. Lien hoa shan: alt. 2750 m., no. 12753, July 14–20, 1925 (climber; flowers yellow, sepals with cream-colored margins).

Page 41.

**Clematis brevicaudata** DC.—Add the following no.:

CENTRAL KANSU. Lien hoa shan: along bank and over shrubs, alt. 2750 m., no. 12750, July 14–20, 1925 (climber, flowers cream-colored).

Page 42.

**Clematis glauca** var. *akebioides* f. *phaeantha* Rehd.—Add the following no.:

CENTRAL KANSU. Lien hoa shan: beyond Yitao, loessy slopes, alt. 1500 m., no. 13228, Aug. 1925 (climber; flowers purplish-brown).

**Clematis tangutica** var. *obtusiuscula* Rehder & Wilson.—Add the following no.:

SOUTHWESTERN KANSU. Tao River basin: around Choni, alt. 2600 m., no. 12917, July 1925 (forming large straggling scandent bushes, common; flowers brownish yellow).

## SAXIFRAGACEAE

Page 51.

*Hydrangea Bretschneideri* Dippel.—Add the following no.:

SOUTHWESTERN KANSU. Tao River basin: below Choni, along shady banks of Tao River, alt. 2500 m., no. 12228, June 1925 (flowers white).

## ROSACEAE

Page 72.

*Rubus idaeus* var. *strigosus* Maxim.—Add the following no.:

EASTERN TIBET. Radja and Yellow River gorges: spruce forests, northern slopes of River valley; south of Radja, no. 13986, May 25, 1926 (flowers white).

## LEGUMINOSAE

Page 84.

*Hedysarum multijugum* Maxim.—Add the following nos.:

EASTERN TIBET. Radja and Yellow River gorges: grassy northern banks of river near Radja, alt. 3000 m., no. 14002, May 27, 1926 (flowers purple). Valley: on loess bluffs, alt. 3000 m., no. 14244, June 1926; on loess bluffs and banks of lateral ravines of valley, alt. 2850 m., no. 14363, July 1926.

## ERICACEAE

Page 106.

*Rhododendron rufum* Batal.—Add the following no.:

SOUTHWESTERN KANSU. Tao River basin: Maerkhu valley north of Minshan, Abies and Picea forest, alt. 3200–3350 m., no. 13675, Sept.–Oct. 1925 (in fruit; flowers pink).

## VERBENACEAE

Page 112.

*Caryopteris incana* Miquel. . . .*Caryopteris Mastacanthus* Schauer. . . .

Change to:

*Caryopteris tangutica* Maximowicz in Bull. Acad. Sci. St. Pétersb. xxvii. 525 (1881); in Mél. Biol. xi. 301 (1881).—P'ei in Mem. Sci. Soc. China, I. no. 3, p. 172 (Verbenac. China) (1932).

A specimen collected by Purdom (no. 792) in the Taochow District also belongs here. The two numbers of the Rock collection cited by P'ei as nos. 12709 and 12755 are mistakes for no. 12765.

## CAPRIFOLIACEAE

Page 120.

*Lonicera microphylla* Willdenow.—Add no. 14070 to the last specimen cited as “three days north of Radja, alt. 3350 m.”

## COMPOSITAE

Determined by J. MATTFELD

**Aster incisus** Fischer in Mém. Soc. Nat. Moscou, III. 76 (1812).—  
Hemsley in Jour. Linn. Soc. Bot. xxiii. 412 (1888).

SOUTHWESTERN KANSU. Lower Tebhu country: gravelly rocky banks of Peshwekiang, alt. 2000 m., no. 14556, Aug. 30, 1926 (shrub 60–90 cm.; flowers white).

**Aster Limprichtii** Diels in Fedde, Rep. Spec. Nov. Beih. XII. 503 (Bot. Reis. Hochgeb. Chin. Ost-Tib.) (1922).

SOUTHWESTERN KANSU. Lower Tebhu country: Oak forest near Nyipa village, Mayaku, alt. 2300 m., no. 14803, Sept. 9, 1926 (shrub 60–90 cm.; flowers white); dry shale slopes under Oaks at Nyipa in Mayaku, alt. 2400 m., no. 15055, Sept.–Oct. 1926 (shrub 60–90 cm.; flowers pinkish white).

**Aster poliothamnus** Diels in Fedde, Rep. Spec. Nov. Beih. XII. 503 (Bot. Reis. Hochgeb. Chin. Ost-Tib.) (1922).

EASTERN TIBET. Radja and Yellow River gorges: among conglomerate boulders in valley near Radja lamassery, alt. 3000 m., no. 14201, June 1926 (flowers lavender).

A distinct and handsome species with numerous lavender-colored flower-heads.

**Microglossa salicifolia** Diels in Bot. Jahrb. xxix. 612 (1900).

SOUTHWESTERN KANSU. Lower Tebhu country: gravelly rocky banks of Peshwekiang, alt. 2050 m., no. 14555, Aug. 30, 1926 (shrub about 1 m.; flowers white); banks of stream, Peshwekiang gorge, alt. 2050 m., no. 14800, Sept. 5, 1926 (forming large clumps; flowers white).

**Tanacetum Rockii** Mattfeld, spec. nov.

Frutex parce ramosus; rami vetustiores lignescentes, cortice griseo tenuiter rimoso obtecti, hornotini herbacei, simplices sursum tantum ramulosi, supra basin foliis delapsis nudi, deinde laxe foliati (internodiis 1–3.5 cm. longis), costati, tenuiter appresse pilosi, dorsum glabrescentes, sursum griseo-tomentelli. Folia sursum magnitudine sensim decrescentia petiolata; petioli tomentelli, 2–5 mm. longi, basi utrinque lobulo herbaceo stipuliformi ornati; laminæ ambitu fere rotundatae, 1–2 cm. latae, 1–1.7 cm. longae, basi truncatae et deinde breviter in petiolum angustatae, margine vix ad tertiam partem sinuatae, supra virides, dense granuloso-punctatae, subtus dense appresse incano-tomentosae, palminerviae, nervis subtus leviter prominulis e basi 3 rarius 5, venam unicam saepius tantum emittentibus, excurrentibus in lobos, lobi 3, inaequi-

formes, apicali iterum trilobulato, lobulo medio late ovato usque subquadrato, interdum utrinque 1-dentato, ca. 3–6 mm. longo, 5–7 mm. basi lato, lateralibus oblique ovatis, lobis 2 lateralibus grosse sinuato-tri-crenatis, crenis deorsum magnitudine decrescentibus, lobulis omnibus obtusiusculis breviter mucronulatis. Inflorescentiae paniculato-corymbosae, axes inferiores ex axillis foliorum orientes bene foliati, 20–6 cm. longi, superiores axi primario brevius longiusve adnati, bracteis foliaceis integris oblanceolatis sparse obsiti, 5–2 cm. longi, omnes corymbulo parvo glomeruliformi, 1–2.5 cm. diametente, bracteolis parvis linear-lanceolatis usque filiformibus obsito terminati, pedunculis propriis tomentellis 0.5–3 mm. longis. Capitula minuta, heterogama; involuci globosi, apice constricti, ca. 2–2.5 mm. diametentes et alti; squamae 3–4-seriatae, glabrae, exteriore ovatae, 1.2–2.2 mm. longae, 0.8–1.2 mm. latae, subobtusae, interiores late ovato-rotundatae, 2–2.5 mm. longae, 1.8–2 mm., latae, latissime scariosae; receptaculum convexum, vix 1 mm. diam., nudum, glabrum; flores omnes fertiles, marginales feminei uniseriati, tubulosi, lobis 5 ovato-lanceolatis 0.5 mm. longis inclusis 2 mm. longi; corolla sparse glandulis megacephalis sessilibus obsita ceterum glabra; flores disci tubulosi hermaphroditi, sparse glandulosi, 2.2 mm. longi, tubus 1 mm. longus, subito paullumque ampliatus in limbum lobis 5 ovatis 0.5 mm. longis inclusis 1.2 mm. longum; styli rami 0.5 mm. longi, apice truncato barbulati; germen epapposum, oblique obovoideum, glabrum, vix striatum, (coctum) mucilaginosum.

SOUTHWESTERN KANSU. Lower Tebbu country: banks of Chulungapu near Wantsang, 1980 m., no. 15097, Sept. 1926 (plant 60–90 cm.; flowers yellow).

Aliam speciem generis hacum foliorum forma camparandam frustra quaesivi, nisi habes folia ceterum longe alieni *Chrysanthemum sinensis* aliquo modo pro similia; notabilia etiam achaenia ecostata, minutiuscule striatula, mucilaginosa ita iis *Artemisiarum* similia.

#### **Tanacetum salicifolium** Mattfeld, spec. nov.

Suffrutex e basi parce ramosus, 30–40 cm. altus; rami vetustiores foliis delapsis nudo, lignescentes, cortice griseo, tenuiter rimoso obtecti, foliorum fasciculo rosulante, anno sequente ramum fertilem terminalem evolvente terminati; innovationes e ramis vetustioribus (iam defoliatis) hornotini steriles, breves, 3–10 cm. longi, deorsum laxe sursum dense fasciculatim foliati; rami floriferi simplices e rosula singuli, 12–20–30 cm. alti, inflorescentia terminati, usque ad apicem laxe foliati (internodiis 0.5–2 cm. longis), fuscescentes, tenuiter arachnoideo-tomentelli. Folia herbacea, simplicia,

anguste linear-lanceolata, (2-) 5–7 cm. longa, 2–5 (-10) mm. lata, basin versus sensim longeque petiolatim angustata vel fere rite alato-petiolata et deinde basi dilatata ramo affixa, apicem versus tardius angustata, obtusiuscula et mucronata usque breviter acuminata, margine integerrimo saepius minute revoluta, supra viridia, primum laxe arachnoidea demum glabrescentia, subtus incanotomentella, nervo tenui percursa. Inflorescentia corymbosa, semi-globosa, saepe glomerata, 3–4 (6) cm. diametriens et aequa alta; pedunculi communes dense tomentosi, 3–6-capitulati, 1–1.5 (-4) cm. longi, pedunculi proprii 1–3 mm. longi; capitula heterogama pluriflora; involuci demiglobosi, 4–6 mm. diametentes; squamae ca. 4-seriatae, dorso herbaceae, laxe arachnoideae, late fusco- vel atrofusco-membranaceo-marginatae, exteriore late ovatae acutae, interiores late obovatae, apice lacerato late rotundatae obtusissimae; receptaculum nudum, glabrum, ca. 1.5 mm. diam., convexum; flores omnes fertiles, marginales feminei uniseriati; corolla anguste cylindrica, sursum attenuata, vix 3 mm. longa, sub lobis 4–5 ca. 0.6–0.8 mm. longis constricta, glandulis sessilibus obsita; flores disci hermaphroditi cylindrico-tubulosi, sursum paullum ampliati, 3.5 mm. longi, glandulis sessilibus obsiti, lobi 5 ca. 0.5 mm. longi; styli rami breves, apice truncato barbati; germen epapposum, angulato-obovoideum, glabrum, eglandulosum, costatum, florum marginalium dorso applanatum.

CENTRAL KANSU: Lien hoa shan: among limestone rocks on summit, alt. 3450 m., no. 12693 (typus) July 1925 (shrub 60–90 cm., flowers yellow).

NORTHERN SZECHUAN: Dongrergo, Gebüsche mit *Spiraea*, *Potentilla*, *Juniperus*, 4000–4200 m., Harry Smith, no. 3529, Aug. 8, 1922; same locality sonnige Blockhänge bei Huang-lung-ssu, 4000–4150 m., Harry Smith, no. 3620, July 22, 1922.

SOUTHWESTERN SZECHUAN (Muli Kingdom): mountains between Wa-Erh-Dje and Muli Gomba, in open meadows, 4350 m., no. 16918, Aug. 8, 1928 (height 60–180 cm., flowers yellow).

Species nova foliis integris anguste lanceolatis inter alias species generis eximia. Specimen no. 16918 foliis amplis ad 10 cm. longis et 1 cm. latis longius acuminatis, inflorescentia paullum altiore, statura elatiore a typo differt.

**Tanacetum falcatolobatum** H. Krashenikov in Not. Syst. Herb. Petrop. IV. 7 (1923).

CENTRAL KANSU. Yellow River basin: rocky gorge of Hsining beyond Hsiang tang, alt. 2125 m., no. 13246, Aug. 1925 (woody plant, 0.3–0.6 m.; flowers yellow).

EASTERN TIBET. Radja and Yellow River gorges: among rocks, banks of river, alt. 3050 m., no. 14193, June 1926 (shrub 0.6 m.; flowers yellow).